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SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE



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See page 309

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ASTRONOMY

Stars in Milky Way

The stars in the center of the earth's galaxy, the Milky Way, are now believed to be cooler and not of the same general class as those in its halo.

► THE STARS in the Milky Way's center are not of the same general class as those in its halo, an astronomer told the National Academy of Sciences meeting in Berkeley.

Dr. W. W. Morgan of the University of Chicago said his studies also suggested the stars in the Milky Way nucleus were not of the same general class as those in the nucleus of the Andromeda Nebula. Both these findings differ from current thought among astronomers concerning the stellar make-up of galaxies.

The Milky Way is the gigantic pinwheel of billions of stars in which the sun and its planets, including earth, are located. The Andromeda Nebula is considered like a twin sister galaxy to the Milky Way. It is also a spiral system with billions of stars, thought to have a form and constitution similar to the Milky Way's.

Dr. Morgan bases his suggestions on studies made by spectroscopic of the starlight from four regions near the center of the Milky Way. These indicate the main contributors to the light in the nuclear region are stars like the sun or cooler ones.

When these spectrograms are compared with those of light from globular clusters in the halo surrounding the Milky Way, he finds differences in general stellar class.

When they are compared with spectro-

grams of the nuclear region of the Andromeda Nebula, Dr. Morgan believes they show a "probable large-scale structural difference" between Andromeda and the Milky Way, even though the two galaxies are believed similar.

Distances to Stars

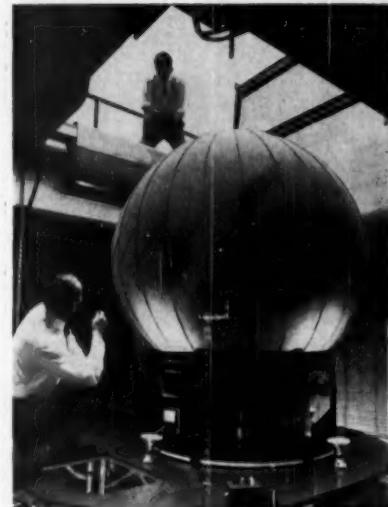
► A NEW METHOD of telling distances to stars, a fundamental problem of astronomy, was reported to the Academy.

Dr. O. C. Wilson of Mount Wilson and Palomar Observatories, Pasadena, said the method was being further investigated to determine exactly how accurately it measures distances. It applies to stars similar to or cooler than the sun.

The method is based on the widths of bright reversed lines found at the centers of certain wide, dark lines of calcium when the star's light is spread out by spectroscope into its many rainbow colors. The widths of these emission features are related to the absolute luminosities of stars from the supergiants to certain dwarf stars.

The observed brightness of a star depends both on its absolute luminosity and its distance, thus a star's distance can be found if its absolute luminosity is known.

Science News Letter, November 15, 1958



HELI SPHERE—A six-foot model of the Helisphere, a new kind of radar antenna, is ready to emerge through the roof of the Westinghouse Research Laboratories as scientists Eugene Kadak and James M. Flaherty stand by.

ASTRONOMY

Universe Age Now Jibes With Radioactive Dating

► THE UNIVERSE is from seven to 13 billion years old, a cosmic age that jibes for the first time with that from radioactive dating.

The latest estimates of the universe's birth time result from studies made with the giant 200-inch Hale telescope atop Mt. Palomar, Calif. The world's biggest "eye" this year begins its second decade helping man understand the vast complexities of space. (See p. 310.)

Within the next five years, Palomar astronomers hope to complete the colossal task of finding out the size of the observable universe and how much matter it contains. They will also try to learn whether the expanding universe shows signs of slowing down at the limits of observable space.

Achieving these objectives is believed possible because of the new accuracy being developed in the "yardsticks" that measure the enormous distances in space, Dr. Ira S. Bowen, director of Mount Wilson and Palomar Observatories, said. The Observatories are operated jointly by the Carnegie Institution of Washington and California Institute of Technology.

Dr. Allan R. Sandage of the Observatories' staff said the large variation in the estimated age of the universe is due to uncertainties that still exist in the measurements. The figures are significant, however, because for the first time they are consistent with the age set by geologists based on the decay of radioactive elements in rocks and meteorites.

Science News Letter, November 15, 1958

ENGINEERING

Radar Antenna Scans

► A RADAR antenna that scans throughout a complete circle without any motion of the antenna structure itself has been fashioned out of 50 yards of drapery material from a local department store.

Known as a Helisphere, it was developed by Eugène Kadak and James M. Flaherty of the Westinghouse Research Laboratories, Pittsburgh.

The antenna is a sphere, either inflated or of rigid construction. Imbedded in its surface are narrow metal conducting strips wound around the sphere in a spiral or helix pattern.

Operation of the antenna is based on the observation that radar waves can be polarized, or made to vibrate back and forth in a single plane. The polarized waves are sprayed against the inside surface of the sphere so that they vibrate parallel to the conducting strips. In this position the surface reflects the waves back to the other side of the sphere. On this side, due to the helix pattern, the conducting strips are at right angles to the reflected radar waves. Thus, the waves pass through the strips and continue on into space as a narrow radar beam.

Experimental versions of the Helisphere

included both rigid and inflated models, with the latter offering the additional advantages of being light, portable and easily erected. The demonstration model, shown in the photograph, was made with drapery material that had decorative metallic threads woven into the fabric.

Westinghouse scientists believe Helisphere is so effective a concentrator of high-frequency radar waves that it will have definite application as an antenna for powerful, long-range, anti-missile radars.

Its non-rotating design permits faster scanning and track rates than conventional antennas that rotate continually, and eliminates the need for driving power. By substituting motion of the radar energy source for antenna motion the antenna construction is simplified and the problem of rotating bearings is done away with.

The demonstration model is six feet in diameter and works on wavelengths of a little more than an inch in length. A full-scale Helisphere, it is estimated, would be about 100 feet in diameter and would employ wavelengths of about one foot in length.

Science News Letter, November 15, 1958

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ASTRONOMY

Mars Made Close Approach to Earth

► MARS MADE a close approach to earth, relatively speaking, when it passed within less than 45,500,000 miles on Nov. 8.

This month the "red" planet is better placed for observation than at any other time until 1971.

Because observations of Mars during the very favorable approach of 1956 were hampered by a great yellow cloud that obscured many surface features, intensive studies of the planet are being made this fall.

One Navy-financed project is to take a look at Martian surface features using a large telescope mounted on a balloon floating 80,000 feet above the earth's surface. In this first attempt to use a telescope for scanning another planet, scientists hope also to discover whether Mars has enough water to support life.

Another plan is to observe Mars with an up-to-date spectroscope attached to the world's largest telescope, the 200-inch Hale reflector atop Mt. Palomar in California. At the time of the 1956 approach, Dr. William M. Sinton of Lowell Observatory, Flagstaff, Ariz., found new evidence for some sort of primitive life form on Mars.

These observations are being checked this month, aimed at confirming evidence of an absorption in the infrared rays reflected from Mars believed caused only by organic molecules.

A new system for naming Martian features has now been adopted by astronomers around the world. Its main novelty is that small details are to be known not by names but by their approximate longitudes and latitudes.

To speed up use of the new nomenclature, the International Astronomical Union has compiled a catalogue of the 128 adopted names and a chart identifying them. The charts are reproduced in *Sky and Telescope* (Nov.), a monthly publication for persons interested in astronomy.

Mars is now most conspicuous in the southeastern evening sky. It shines with a brilliant reddish color, and is in the constellation of Taurus, the bull. (See SNL, June 30, 1956, p. 407.)

When Mars and the sun are in opposite directions in the sky, astronomers call this opposition. Mars reaches it on Nov. 16.

Science News Letter, November 15, 1958

PHYSIOLOGY

Beam of Protons Halts Cell Growth of Brain

► A NARROW beam of high-energy protons, the cores of hydrogen atoms, can be used to injure or destroy cells in specific, limited regions of the brain or central nervous system.

This finding, so far applicable only to animals, could mean that proton beams can halt the growth of cancers or other unwanted growths of the central nervous system

in man in the future. Studies of long-term effects of such irradiation on the brain are in progress, six Swedish scientists report in *Nature* (Nov. 1).

Advantage of the narrow proton beam is that it produces sharply defined and limited lesions at the desired spot, with little or no effect on surrounding tissues. The observations apply only to lesions in their relatively early stages, the scientists stress.

The six are Drs. Borje Larsson, Lars Leksell, Bror Rexed, Patrick Sourander, William Mair and Bengt Andersson of the Gustaf Werner Institute of Nuclear Chemistry, and Institute of Anatomy, University of Upsala.

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ENGINEERING

Ground Steam Tapped

A new natural power source is being used in New Zealand as engineers convert underground live steam to electric power.

► STEAM PRODUCED from nature's underground boilers is being converted to electric power in New Zealand on a major scale.

Dr. Frederick J. Llewellyn, vice chancellor of the University of Canterbury, Christ Church, South Island, N. Z., and former chemistry professor, visiting the United States, told SCIENCE SERVICE the project represents work begun a decade ago with surveys by his government.

The installation at Wairakei, North Island, which began operations August, uses live steam piped up from a depth of 3,000 feet to turn high and low pressure steam turbines. They will generate a total of 250,000 kw when the facility reaches its full capacity.

Use of steam from volcanic regions to generate electricity is not new. The Italians experimented with the technique at Lardarello prior to World War II, Dr. Llewellyn said, but New Zealand expects to exploit the principle on a larger scale.

The New Zealanders are still not sure

how big their source of steam is, but scientists believe the supply is "inexhaustible," Dr. Llewellyn said. Some bores drilled eight years ago have been blowing ever since with no appreciable slackening of pressure. Geysers erupt to a height of 60 feet.

The Wairakei Hotel, situated in the heart of the 3,000-square-mile steam region, uses the underground supply for its hot water system, and others heat their homes with it. Persons have journeyed to the area for years seeking relief of ailments by baths in the warm waters.

The power generated at Wairakei will be comparable to the output of Berkeley or Bradwell nuclear power stations in England. Most of New Zealand's power at present is hydroelectric. Since most practical dam sites have been developed and its coal and oil deposits are not commercially important, underground steam represents a substantial hope for meeting growing power needs.

Science News Letter, November 15, 1958



WARNING TUBE—An ultraviolet-sensitive tube that responds to flame, smoke and combustible vapors simultaneously indicates the presence of any of the three. Mathias J. Grundner, a research scientist with the Minneapolis-Honeywell Regulator Company, demonstrates how the tube works when both fire, smoke and combustible gases (in the beaker) are present. The four-inch tube "sees" invisible ultraviolet light.

ENGINEERING

U.S. Leads in Fusion

► THE UNITED STATES is "undoubtedly the world leader" in controlled fusion research to harness the energy of the hydrogen bomb.

Edward W. Herold, director of electronic research laboratory for the Radio Corporation of America Laboratories, told the annual meeting on electron devices of the Institute of Radio Engineers in Washington that Russia is probably in second place and Britain trailing third. Americans submitted 60% of the papers on controlled fusion at the Geneva Conference in September, and displayed the best equipment.

Britain may lose out in the race to convert H-bomb power to commercial use because of her overemphasis on one approach, the "pinch effect," he warned. At present, both Russia and the U. S. are exploring other ways to produce and contain extremely hot plasmas necessary for H-bomb reactions. To obtain power from such conditions, heavy hydrogen must be heated to about a hundred million degrees.

The numerous papers submitted on pinch-effect work left the impression at Geneva this year that there is some unknown action which causes a "tremendous loss of energy," he declared. The result is that scientists have been unable to heat the plasma (or highly energized gas) higher than one or two million degrees, only a fraction of the heat needed. The pinch effect is achieved by making the hot plasma contract in a

strong magnetic field, so that it does not touch any walls. Material walls would cool the gas, and no known material could withstand the extreme temperatures needed for thermonuclear reactions.

Mr. Herold said there has been increasing interest in the past year in solving the containment problem using microwaves. A U.S.S.R. paper at Geneva described successful experiments using a microwave "cavity" as a plasma reflector.

Russians also displayed a model of a large controlled fusion apparatus at Geneva which is not yet working, but which resembles a device at Oak Ridge National Laboratory known as the DC-X. The latter uses "mirror" containment with magnetic fields.

The speaker said the so-called "mirror" containment of the gases with steady magnetic fields is "still a very promising approach," and that this type of work now in progress at the University of California's Radiation Laboratory, Livermore, and Oak Ridge, promises to be fruitful.

"I believe that the next five to ten years will see the major scientific problems solved, but that it will take several decades beyond this to make controlled fusion power practically available to mankind," he said. He compared the state of the art now as equivalent to television in the year 1920.

Science News Letter, November 15, 1958

AERONAUTICS

Aircraft Designed For Agricultural Use

See Front Cover

► THE "AG-CAT," a new antique-looking biplane designed specifically for the agricultural market as a crop-duster and sprayer, has completed its first flight, Grumman Aircraft Engineering Corporation has reported.

The photograph on the cover of this week's SCIENCE NEWS LETTER shows the plane which has an overall length of 24 feet, 4 inches, a wing span of 35 feet, 8 inches, and a height of 10 feet, 9 inches.

The airplane features interchangeability of upper and lower wings and all four ailerons, spring steel landing gear and a "sloping" nose which affords excellent visibility in normal flight attitude.

Science News Letter, November 15, 1958

● RADIO

Saturday, Nov. 22, 1958, 1:35-1:45 p.m. EST
"Adventures in Science" with Watson Davis, director of Science Service, over the CBS Radio network. Check your local CBS station.

Dr. Heinz Fraenkel-Conrat, professor of virology at University of California, Virus Laboratory, Berkeley, Calif., and an Albert Lasker Award Winner, 1958, will discuss "Molecules in Inheritance and Disease."

ASTRONOMY

Ten Years at Mt. Palomar

In the ten years since the 200-inch telescope atop Mt. Palomar first began functioning, astronomers have learned much about the sun, stars, planets and other celestial bodies.

► THE WORLD'S largest telescope, the 200-inch mirror atop Mt. Palomar in California, is aimed at almost every kind of object in the sky.

It has been turned on an invisible star with the smallest mass known, about one-twelfth that of the sun, and the largest yet discovered, the giant Alpha Herculis, 200,000 times the solar diameter, which is visible to the naked eye.

Many heavenly objects whose light is gathered by the giant mirror, however, are not visible with any other telescope. Most of them are not single stars like the sun at all, but swarms of millions and millions of stars formed into clusters known as galaxies.

Yet even these huge clusters of billions of suns are so far away their light can be caught only on photographic plates. Studies of the light from such far-distant systems give scientists clues to the age and structure of the universe.

One finding, so unexpected much more research is being performed to confirm it, is that the rate at which the universe appears to be expanding seems to be slowed down at the very limits of space visible with the 200-inch.

Instead of accelerating at a rate that grows faster and faster directly with distance, there is some evidence the rate falls off for the very faintest objects, which are thought to be both the oldest and the farthest away. Their age is believed to be five billion years, and their distance about two billion light years, one light year being the distance light traveling at 186,000 miles a second covers in one year.

Law of the Red Shift

These far-away galaxies still seem to be moving away from the solar system with more speed than the nearer ones. It is the rate of acceleration with growing distance that shows an apparent slowdown. The so-called law of the red shift, by which a star's light is shifted toward the red end of the spectrum the farther away it is, does not seem to hold at the fringes of the visible universe.

This red shift indicates the farthest galaxies are speeding outward at a velocity about one-fifth that of light. However, measurements on other faint galaxies show rates of recession that would be expected if the universe were expanding at a uniform rate.

These conflicting observations are now being resolved by further studies.

Dr. Ira S. Bowen, director of Mount Wilson and Palomar Observatories, said only a few galaxies can be used for this purpose. Some of these most distant clusters are in good position for viewing either in the fall or spring for a short time only, Dr. Bowen pointed out, so it is taking

astronomers quite a long time to confirm the seeming decrease in expansion rate or to show it in error.

Astronomers who use the 200-inch telescope actually make their "discoveries" in Pasadena some 130 miles away. Only on nights when they are taking photographs with one of the three telescopes on the mountain top, or listening to the radio waves broadcast from the heavens, do staff members or visiting astronomers make the nearly four-hour trip from Pasadena to Mt. Palomar.

Usually five or six consecutive nights are allotted to one person for observing with the 200-inch. This is because special equipment is often needed and adjusting the devices is time-consuming.

More than enough photographs can be taken during these few nights, however, to keep an astronomer busy in Pasadena for the weeks between observing times.

After arriving at the 5,600-foot plateau, an observing astronomer spends the afternoon making sure everything is in readiness for the first night's work.

No Moonlight for Photography

Some astronomical studies, those requiring direct photography, can be made only on clear, moonless nights. Moonlight interferes less with catching a particular star's light as it is fanned out by the spectrograph, so such studies are made on nights when the moon is bright. About one-half the observing time of the 200-inch is devoted to spectroscopic work.

Although only one astronomer uses the 200-inch at any time, a night assistant is always on duty, not only for safety's sake but also to help keep the giant telescope precisely aimed. The telescope's time is considered much too valuable to be used for visual studies, but to make sure they are photographing the desired star, astronomers occasionally take a look through the 200-inch.

To insure that the telescope will have the same temperature as the outside air, the huge dome is opened as early as possible in the evening, often half an hour before sunset. On a mile-high mountain, even in southern California, temperatures can drop quite low, so observing astronomers and their assistants wear extra-warm clothing and heavy gloves, as well as thick-soled shoes for insulation from the concrete floors.

Besides the 200-inch telescope on Mt. Palomar, there are two more optical telescopes and one radio telescope.

Of these, the 48-inch Schmidt telescope, with its wide field of view, is probably the best known. The other optical instrument is an 18-inch Schmidt. Using the 48-inch,

Mt. Wilson and Palomar astronomers have completed a photographic survey, in both red and blue light, of all the heavens that can be seen from Mt. Palomar. This study occupied virtually the whole observing time of the instrument for seven years starting in July, 1949.

The sky survey, which recorded objects throughout a volume of space about 25 times as large as previously, was financed by the National Geographic Society. The photographs have been reproduced in atlas form, available to interested institutions.

With the 48-inch Schmidt, areas of the sky equal to that of 200 moons can be photographed at one time. Interesting objects located on such plates are then scanned in detail by the 200-inch. A Schmidt telescope has a correcting lens through which the star's light passes before reaching the mirror.

Large Schmidt-type telescopes have no provision for use by the human eye, but are used entirely as cameras.

Radio Astronomy Program

The radio telescope has a 32-foot antenna. Its operation marks the beginning of a long-term radio astronomy program by the California Institute of Technology, which, with the Carnegie Institution of Washington, manages Mt. Wilson and Palomar Observatories.

This equipment will serve mainly as a pilot model and as a training instrument for astronomers and electronic specialists. The observatories also operate a pair of radio astronomy antennas. Both of them are 90 feet in diameter and they are located in Owens Valley on the California desert.

The two large antennas are steerable and mounted on railroad flat-cars on 1,600-foot-long rails set in north-south and east-west directions and meeting at a point. With this set-up, the instruments can be operated separately or as an interferometer whose axis and spacing can be varied over considerable ranges, giving them exceptionally high ability to distinguish between sources of radio waves that are close together.

These radio telescopes are teamed up with the Schmidt telescopes and the 200-inch in programs planned to increase man's knowledge of the universe.

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GEOPHYSICS

IGY Scientists Vote To Extend Activities

► THE CURRENT International Geophysical Year, scheduled to end Dec. 31, has been extended. A new program of further research in geophysics and related sciences will begin on Jan. 1, 1959.

Several of the scientific groups voted to expand research activities and requested an indefinite extension of cooperative studies. Scientists at the fifth IGY meeting in Moscow agreed to call the new program "International Geophysical Cooperation, 1959."

Science News Letter, November 15, 1958

GENERAL SCIENCE

"Clocks" and Fossils

The daily rhythm of activity and rest that is characteristic of animals appears to be determined by an "internal clock" located in the brain.

► THE INTERNAL "clock" that governs an animal's daily rhythm of activity and rest is in the brain, study of rats indicates.

The effect of brain surgery in changing the daily rhythm of rats was reported to the National Academy of Sciences meeting in Berkeley, Calif., by Dr. Curt P. Richter of Johns Hopkins Hospital, Baltimore.

The length of the daily activity cycle, Dr. Richter found, is independent of the effects of various drugs or of outside influences such as temperature. But apparently it can be influenced by unknown cosmic agents or by removal of the organs of smell and by thyroxin, as well as by operations on the brain.

After brain surgery, an individual rat may start its daily period of activity as much as an hour earlier each day. Another rat may start as much as 40 minutes later each day. This means such a change in the activity period that eventually the animal may change from a nocturnal animal to an animal that is active during the whole day.

One rat, after surgery, has for months started running almost exactly 26 minutes earlier each day regardless of the noise and other disturbances caused by other rats and by laboratory workers.

Such studies of animals, Dr. Richter said, may help to explain the mystery of the inverted sleeping-waking rhythm of some human patients suffering from sleeping sickness.

Fossil Marine Animals

► MUCH of the earth now described as temperate in climate was probably tropical just a few million years ago.

Studies of fossil marine invertebrates, animals without backbones, indicate that some

METALLURGY

Study Metal Extraction

► HOW TO EXTRACT the metals contained in the billions of tons of nodules on the ocean's floor is being studied by two University of California engineers.

Nodules are small, brown-black stones, usually less than six inches in diameter, that dot some 40,000,000 square miles of the floors of the world's oceans. Millions of years ago they began growing around bits of volcanic glass, pumice, clay and such oddities as sharks' teeth.

It is believed the nodules could be recovered with present technology, using such equipment as a huge dredge resembling a vacuum cleaner, artificial light sources and television cameras.

The problem Dr. Herbert E. Hawkes and

60,000,000 years ago tropical temperatures extended up above the middle latitudes, Dr. J. Wyatt Durham of the University of California reported.

The fossils appear to be closely related to modern warm water animals, Dr. Durham told scientists at the Academy of Sciences meeting. This also appears to support theories that continents and the geographic poles were in their present position 60,000,000 years ago and that they probably had not changed position since even 500,000,000 years ago.

During this time it appears the tropical zone was more widespread than now, Dr. Durham concluded. Restricted tropics, including those of the present time, are probably abnormal, he said.

Hypnosis Susceptibility

► THE MOST easily hypnotized persons are those who are well-adjusted and outgoing, Dr. Ernest R. Hilgard, psychologist of Stanford University, reported to the Academy.

They are not especially the submissive, "follower" type, he said, but are capable of taking the role of leader as well as that of follower.

Dr. Hilgard learned of the characteristics of especially hypnotizable persons by study of a group of 74 students. Attempts were made to hypnotize the students individually by a standard procedure. Those who were most susceptible to hypnosis and those who resisted it most strongly were interviewed by a psychiatrist.

It is planned to construct a personality inventory that will predict susceptibility to hypnosis.

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and lesser amounts of nickel, copper and cobalt, as well as a number of rare earth metals.

A new mineral processing technique for nodule mining is needed since no suitable processing method exists.

Studies of nodule distribution suggest that "vacuuming" one square mile of ocean bottom in a good location would yield approximately 6,000 tons of manganese, 4,000 tons of iron, and 125 tons each of nickel, copper and cobalt. Converted to dollars and cents, this would amount at present values to about \$750,000 worth of manganese ore, \$40,000 worth of iron ore, \$180,000 worth of nickel, \$60,000 worth of copper and \$500,000 worth of cobalt.

Since all the nodules lie in areas beyond the three-mile limit, a legal claim is not recognized and competition between countries could become intense.

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ZOOLOGY

Prairie Dog Population Declining Fast

► IN ABOUT ten years the prairie dog may join the growing list of extinct animals.

Today the prairie dog population in Kansas is being severely reduced. While the small rodents had some 2,500,000 Kansas acres to roam on in 1903, now they have about 57,000 acres or less than one-fiftieth of that land. In 1958 it is expected the prairie dogs will lose another one-fourth of their Kansas living space, Ronald E. Smith of the University of Kansas Museum of Natural History and State Biology Survey said.

Grazing and cultivation of the land has been largely responsible for the animal's decline, Mr. Smith said. The prairie dog, which is a plant eater, is sometimes responsible for damage to crops.

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PALEONTOLOGY

Fossil of Canada Goose Points to Long History

► THE CANADA goose has been around for a long time and in many different parts of the country.

New fossil remains found in St. Paul now place the bird in Minnesota as well as Oregon, California, Florida and Nevada, Dr. Alexander Wetmore, research associate at the Smithsonian Institution, reports.

Apparently, Dr. Wetmore explained, the goose maintained itself as a species throughout the great glacial period that preceded modern times. The St. Paul fossil, a fragment of wing bone, marks a new point for Pleistocene records of the Canada goose; it can be dated as belonging to the early Pleistocene which began approximately 1,000,000 years ago.

Scott K. Wright of St. Paul found the wing bone fragment at the bottom of a large trench being dug in an ancient peat bog by the city water department. Remains of an ice-age species of bison were also found in the same trench.

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John Mero are studying is how to process the nodules and separate them into metals at competitive prices.

Mining nodules could be especially important in giving the United States a source of the important minerals, manganese. Almost all manganese used in the United States is imported.

Recently scientists at the University of California's Scripps Institution of Oceanography, La Jolla, discovered and explored a huge store of nodules in relatively shallow waters off the French-owned Tuamotu Islands in the South Pacific.

Nodules recovered from this area during Scripps's Downwind Expedition contained approximately 25% manganese, 15% iron,

PUBLIC HEALTH

Accidents Becoming Epidemic in United States

► ACCIDENTS are epidemic in the United States, taking more lives in every age group from one to 35 than any other cause.

It is time to study accidents as a public health problem and to evaluate their causes and "cures" the same way we do an influenza epidemic or any other epidemic.

This would involve extensive study of the problem, Dr. Albert P. Iskant said. Chief of operational research for the U. S. Public Health Service's accident prevention program, he addressed his remarks to the American Public Health Association meeting in St. Louis, Mo.

Statistics reveal several interesting aspects of the accident toll: age, sex, marital status, race, state of health, geography, season and time of day appear related to accidents.

The "deadly ages," when accidental deaths in general are most common, are under one and past 65. For the late teens and early twenties, automobiles cause about one-third of all deaths. In 1930 this figure was less than ten percent.

Men have a higher death rate than women; non-whites, both male and female, in general have a higher accidental death rate except when it comes to aircraft, machinery, electricity and falls.

Married persons have fewer accidental fatalities no matter what the cause or the age. Divorced persons have the highest rate in this category, with widows and widowers falling in between.

Automobiles, falls, fire and explosion, drowning, and poisoning account for the approximately 100,000 accidental deaths each year.

In 1956, cars caused some 40,000 deaths; poisoning caused the least number of deaths, more than 2,600.

"Analysis of death certificates available to health departments can reveal much information which helps to delineate the problem and assist in program planning" to fight the accident epidemic, Dr. Iskant concluded.

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PHYSIOLOGY

Electrical Impulses Sent To Brain Control Behavior

► WELL-FED rats can be induced to make pigs of themselves.

Scientists have found that they can control the eating, sleeping and other behavioral patterns of animals by electrically stimulating a portion of the brain in the hypothalamus.

Damage or destruction of one part of this portion of the brain can cause the animal to have a voracious appetite. In fact, the animal will eat twice or three times the normal amount of food. This can lead to a degree of obesity in which the body may contain 70% fat, Dr. C. N. H. Long of Yale University has found.

On the other hand, damage to a spot slightly adjacent to the appetite control

center of this portion of the brain can lead to ultimate starvation amidst an abundant food supply, he said.

Three other Yale scientists have also found another area of the brain that controls emotions. This center is located in the lower part of the brain, Drs. Jose M. R. Delgado, Neal E. Miller and Warren W. Roberts explained.

The scientists applied electrical stimulation to the emotion area of the cat's brain. The animal then learned to fear a white box it had previously preferred. It would jump out of the white box into a black box. Hungry cats also learned to control their appetites and avoid food when stimulated in the emotion area of the brain.

The first public showing of films of actual demonstrations with rats and cats proving that such emotions are deep seated in the brain will be on the science program, "Conquest," over the CBS television network on Sunday, Nov. 16. It has been prepared by CBS in conjunction with the National Academy of Sciences and the American Association for the Advancement of Science.

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MEDICINE

Bootleggers' Cocktail Produces Bizarre Effects

► BOOTLEGGERS have concocted a new drink composed mainly of rubbing alcohol and mothballs.

Nicknamed "scrap iron," the drink produces bizarre and serious mental effects, three South Carolina scientists report.

They reported 50 cases of severe intoxication within a three-month period from the mothball "cocktail." Those patients that were aware mothballs had been added to the mix stated the mothproofing ingredient added some "kick to the drink." Drs. R. Ramsey Mellette and William C. Miller Jr., assistant psychiatric residents, and Dr. Richard H. Gadsden, assistant professor of chemistry, of the Medical College of South Carolina, reported their study of the cases in the *Journal of the American Medical Association* (Nov. 1).

Other ingredients in the drink include yeast, cracked corn or corn meal, sugar, and sometimes the addition of Clorox, the bleaching agent. This last ingredient is added to speed up the action of the others.

The entire mixture is prepared in galvanized drums, which might account for the metallic taste and the name "scrap iron."

"Obviously this is a drink of 'voltage rather than vintage,'" the scientists said. In addition, they suggested that steps be taken to hinder the sale of the toxic substance.

A majority of the victims exhibited symptoms of an acute or chronic mental disturbance "out of proportion to the amount of alcohol consumed." Some showed symptoms identical to those of delirium tremens from ethyl alcohol such as restlessness, hallucinations and illusions.

Most of the symptoms subsided within several days simply with the use of fluids, vitamins and tranquilizers.

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IN SCIENCE

METEOROLOGY

Weather "Cure" Seen Worse Than Ailment

► THE "CURE" of weather modification may be "worse than the ailment," the Weather Bureau's director of meteorological research has charged.

Dr. Harry Wexler said no attempts at making large-scale weather changes should be made until all possible effects have been evaluated.

His qualitative study showed, for instance, that making an artificial ice cloud over the Arctic Ocean to raise the temperature there would give persons living in the latitudes from 50 degrees to 65 degrees north winters with heavier precipitation than normal. In North America, the heavy snows would blanket an area roughly from the Canadian border north to the Arctic circle. They would also fall on most of northern Europe and virtually all of Russia.

Persons living in latitudes from 35 degrees to 50 degrees north, on the other hand, would likely have less winter precipitation than normal.

Dr. Wexler's views on the effects of a hypothetical ice cloud are reported in *Science* (Oct. 31). Dr. Wexler makes it clear he does not consider it very practical at this time to make and maintain a widespread artificial ice cloud over the Arctic.

If this could be done, however, the effects of an extensive polar cloud should be predicted using "the full resources of general-circulation and computational meteorology" to avoid undesirable results.

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WILDLIFE

Musk Ox Coming Back After Near Extinction

► THE OO-MING-MACK is no longer in danger of extermination.

Better known as the musk ox (oo-ming-mack is the Eskimo word), the animal is making a comeback in experimental herds in Alaska and Canada. A few years ago, the musk ox, which has been nearly killed off by hunters, was believed to have found its last home in northern Greenland.

Efforts to establish herds in northern Europe and Iceland have not been successful, Dr. Hartley H. T. Jackson says in the Annual Report of the Smithsonian Institution.

It is unlikely, Dr. Jackson, a retired biologist of the U. S. Fish and Wildlife Service, says, that the animal will ever be useful to man. While its wool is one of the finest known, comparing favorably with vicuna, it is mixed with coarse hairs. No economical separation method has been developed, the scientist points out. Also, although musk ox meat is nutritious, it too tough for most people.

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SCIENCE FIELDS

PHYSICS

Very Precise Experiment Reconfirms Relativity

► A VERY PRECISE experiment measuring the variation in frequency of radio waves radiated by ammonia molecules during one day has given strong further confirmation of Einstein's special theory of relativity.

The experiment showed exactly what changes in wave frequency occurred when a stream of molecules travels in the same direction as the earth in its orbit and when the molecular stream travels in the opposite direction.

According to Einstein's theory, there should be no change in light velocity, or in radio wave frequency, when the molecular beam source travels with the earth's orbital velocity or against it.

Previous experiments, starting with the classic Michelson-Morley experiment, have confirmed Einstein's theory but not as precisely as the present test.

The results can be expressed in terms of the earth's velocity with respect to a fictitious ether, which was thought before Einstein's theory to pervade the universe. The present experiment used a maser, an acronym for Microwave Amplification by Stimulated Emission of Radiation. It showed that any velocity with respect to such an ether is 50 times less than the amount detectable by previous experiments.

The maser used is a tubular cavity through which flows a beam of ammonia molecules radiating waves at their natural frequency. It was first developed by Prof. C. H. Townes, J. P. Gordon and H. J. Zeiger of Columbia University in 1954.

In the experiment, J. P. Cedarholm, G. F. Bland and B. L. Havens of the International Business Machines Corporation's Watson Research Laboratory, and Prof. Townes used the maser as an atomic clock that measures molecular wave frequencies to an accuracy of one part in one million millions, 10^{12} .

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MEDICINE

New Syphilis Test Proves Inexpensive and Fast

► A SLIGHT prick on the finger or toe is all that a person need suffer while undergoing a new screening test for syphilis.

This is because the new procedure, known as the PCT test, requires only a drop of blood. The test was developed by Dr. John J. Andujar and associates in the Texas Department of Health Laboratory at Fort Worth. Results of trials with 3,000 persons were reported at the meeting of the American Society of Clinical Pathologists in Chicago.

Since the test uses the drop of blood plasma that usually ends in the wastebasket when cell counts are made, it can be per-

formed along with routine blood tests.

It is also inexpensive, in the pennies-a-test class, depending upon the number of tests performed, the scientists said. Results appear rapidly, in as little time as eight minutes.

Since capillary blood from the fingertip is used, the new test does not entail the risk of infection, blood clot or pain occasionally associated with taking blood from a vein.

Hospitals will not need elaborate equipment, since most of them have on hand the disposable lancets, tubes and supplies required, the scientists said.

The test is reliable as a screening process because it may report false positives rather than errors of false negatives. It is for this reason that PCT is intended for screening and not as a positive test, they explained.

The key to the new test was the discovery that a combination of unheated plasma with choline chloride could be used to test for syphilis. Tests such as the famous Wassermann and its adaptations require blood serum from blood taken from a vein. The serum must be heated, a troublesome procedure.

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BIOCHEMISTRY

Cow Adrenal Extract Affects Insect Aging

► AN ABSTRACT from the adrenal gland of cows can prevent maturing in insects, two Cornell University scientists have reported.

Discovery of this adrenal cortex extract is believed to be the first chemical isolated from a vertebrate that has influenced invertebrates growth. While it does not seem to function as the "juvenile hormone" in vertebrates, the chemical extract mimics in detail the action of this hormone in insects.

Studies by Dr. Howard A. Schneiderman and Lawrence I. Gilbert have shown that the chemical also exists in other forms of life, even in the primitive jellyfish. This suggests, the scientists said, that the hormone may be a key life substance.

The chemistry of the juvenile hormone seems to point to its being a steroid. If this is true, Dr. Schneiderman said, "the juvenile hormone is not only widespread but is extremely ancient."

So far it is not known just what it is in the extract that affects insect maturation. It is not identical to the more than 50 cortical components and derivatives studied, the scientists explained. The extract "appears to be a unique and specific group of substances with juvenile hormone activity."

In previous research, also supported by the National Heart Institute of the U. S. Public Health Service, the juvenile hormone was identified as a secretion of the corpora allata, glands located behind the insect's brain. The location of the substance in jellyfish is still not clear.

Further studies of the effects of the hormone on other animals, including crustacea, rats and frogs, are being made.

Details of the research appear in *Science* (Oct. 10).

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BACTERIOLOGY

Phagocytosis Influenced By Bacteria Structure

► THE STRUCTURE of a bacterium, whether it is a smooth or rough form, makes a difference in its chances of being "swallowed up" by a white blood cell, or phagocyte, a group of Polish scientists reported.

Phagocytosis is the process by which amoeba-like cells, such as the white corpuscles or leucocytes, ingest bacteria and other foreign material. It is still a relatively unknown phenomenon, the scientists say. However, their experiments, reported in *Nature* (Nov. 1), pointed out several of the factors influencing phagocytosis.

Working with species of bacteria known as intestinal bacilli, the scientists mixed equal volumes of bacterial suspensions, washed leucocytes and inactivated horse sera.

(Blood serum, the clear, yellowish liquid that remains when the blood cells and fibrin are removed, is known to contain antibodies. It is therefore important to studies of how the body builds immunity against disease and infection.)

Results of the experiments suggest there is an "as yet unknown" factor in normal horse serum that is important in the phagocytosis of smooth bacterial forms. The phagocytic test also may be very useful, the scientists reported, in detecting differences between various bacteria since it shows up smooth and rough forms and those in between.

"New possibilities of studies on the antigenic structure of bacteria" were also suggested by their results.

S. Slopek, A. Skurski, E. Michalska and L. Dabrowski of the Institute of Immunology and Experimental Therapy's department of bacteriology, Polish Academy of Sciences, Wroclaw, reported the research.

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MEDICINE

Too Much Oxygen Can Slow Heart

► TOO MUCH OXYGEN during anesthesia may be responsible for heart failure, a doctor reported in Chicago.

Prolonged administration of oxygen-enriched air to animals brought instant cardiac arrest in what appeared to be healthy hearts, Dr. Sam E. Stephenson Jr. of the department of surgery and pediatrics at Vanderbilt University School of Medicine reported at the meeting of the American College of Surgeons.

Animals anesthetized with barbiturates breathed air in which the concentration of oxygen varied. As the amount of oxygen increased, the amount of carbon dioxide in the blood rose while the electrocardiogram registered rapid changes.

This evidence is "quite distressing," Dr. Stephenson said, when one considers the degree of hyperventilation, excess oxygenation and wanton changing of oxygen concentration that occurs during anesthesia for surgical procedures.

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GENERAL SCIENCE

Summer Science Harvest

Fall brings evaluation sessions and planning meetings of industrial, professional and educator groups sponsoring special summer programs for student scientists and science teachers.

By SHIRLEY MOORE

► WHEN THE autumn breeze turns brisk, it is harvest time for another hopeful planting of "summer science."

Annual planning meetings first weigh the summer's gain in helping and encouraging student-scientists and science teachers. Then next year's activities are organized on the basis of this firsthand experience in a very new field.

The story of this past summer's progress is an exciting one. Of particular interest are the reports of industries, professional organizations and school systems on their recently concluded programs. Some of the sketched-in experiments are ready to be developed and broadened in scope, and still other innovations now may be tried out.

Next summer may well be the most "scientific" in history in terms of unprecedented opportunities for students and teachers to explore their special interests under expert guidance. Many educational programs look forward to expansion, and more and better summer-science jobs are expected to be available for students.

Satellite Summer

In this summer of the satellites, nearly every corner of the country had some sort of science activity going on. The possibilities ranged through concentrated learning, learning and earning at the same time, and even vacation entertainment with a distinctly scientific flavor.

Summer science schools, camps, courses, institutes and seminars flourished on college campuses, in the mountains, at the seashore, in city schools and in museum workshops. They were held for a few days, or on Saturday mornings, or they were in session during most of the summer. Age groups from small children to teachers with doctorates were represented in the various programs.

Whatever the details, or however new and frankly experimental the plan was, all of these activities were bound together by a common idea and all of them shared an atmosphere of the most infectious kind of enthusiasm.

This was evident, for example, in a Maryland "pilot" experiment involving 121 fifth and sixth graders of high ability in six weeks of "school for fun." With the cooperation of elementary and high school teachers, plus professional scientists and laboratories in Montgomery County and nearby Washington, these youngsters explored such advanced subjects as computers, atomic physics, cosmic rays, astronomy, chemistry and paleontology. They astonished visiting lecturers and their hosts on field trips by the

depth of their searching questions and what one of their teachers called their tiger-like "ferocity" in tracking down and understanding the answers. That they were interested, but not in the least over-awed, by the advanced science presented to them is illustrated by a sixth grader's challenging a 704 computer to a game of checkers. Another lad demonstrated his own binary and ternary system of counting which involved very rapid flashing of fingers and knuckles in a series of combinations.

On the high school level, such famous programs as the ones at the Jackson Memorial Laboratory, Bar Harbor, Me., and other specialized centers again admitted competent students for intensive work in vacation surroundings.

Loomis School, Windsor, Conn., held its second-summer precollege Science Center, cosponsored by the Dorr Foundation and a number of Connecticut industries, for 35 boys in the 10th and 11th grades. A nine-week summer session was held for 26 girls and boys by St. Mark's School, Southboro, Mass., and the Worcester Foundation for Experimental Biology, with emphasis on advanced laboratory work in biochemistry and

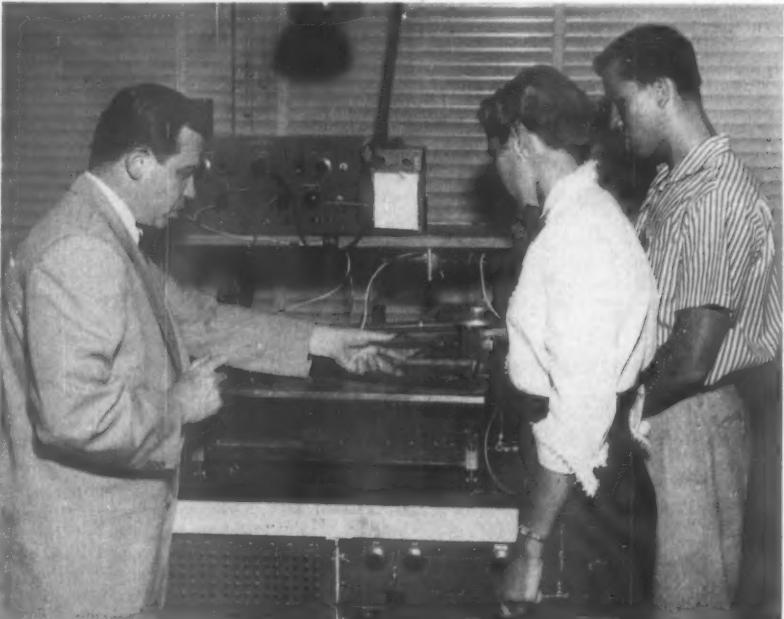
physiology. This program was in its fourth highly successful and productive year.

Another 100 students, all boys, were "charter members" of a six-week advanced studies program at St. Paul's School in Concord, N. H. Forty seniors attended a 12-day institute at State University Teachers College, New Paltz, N. Y.

The Science and Mathematics Camp at the University of Kansas, Lawrence, Kans., conducted its third annual session from June 15 through July 3, with 75 recommended high school students working under college faculty members. Housed in dormitories with Music and Art Camp students, the pre-scientists carried out their own experiments in laboratory or field work in everything from anatomy and astronomy to radiation physics and zoology. A special Apprenticeship Program was initiated this year to give outstanding graduates of the Camp three additional weeks to venture further into their particular fields.

The 25 teen-agers who attended the first Fairfax County (Va.) Summer Science Institute summed up the reactions of most such pre-scientists. At the concluding session of this new experiment, when they were asked to evaluate the program and make frank suggestions, they offered such comments as:

"Tell the scientists to talk over our heads and tell us what we don't already know something about."



FIRSTHAND SCIENCE—Two Los Angeles high school science students, Sharon Lisle and Robert Writer, see science principles in action at the Hughes Aircraft Company, Los Angeles, as part of the Hughes Summer Education Program. Dr. L. M. Field, laboratories associate director, is explaining the functions of an electrolytic tank.

"Let's concentrate on really obscure work, not on what any reasonably bright student can read in a book."

"The whole purpose of an institute is to get people to thinking, discussing and organizing ideas. Give us more chance to do this!"

"Let us try things for ourselves with our own hands. Never mind the demonstrations."

This sampling of the many similar programs all over the country suggests the intense, responsive interest generated in students, teachers and scientists. Nearly everyone comes out of such an experience a dedicated missionary bent on getting other people to start similar activities next year. The current fall evaluation sessions are harvesting many practical recommendations for next summer's pioneers.

Educating Teachers

The teachers had their own institutes, too, financed for the most part by the National Science Foundation. Held at universities all over the country, they attracted more than 6,000 science and mathematics teachers to refresh their knowledge of their subjects and to learn the newest ways of teaching them. According to present reports, about 16,000 teachers will attend these institutes next summer.

The Summer Education Program of the Hughes Aircraft Company, Los Angeles, Calif., is an example of the many summer science programs set up by industry. Now in its third year, this summer's program included more than a hundred teachers from universities, junior colleges and high schools, many college graduate and undergraduate students, and six gifted high school students from the Los Angeles area—all of whom held salaried jobs at the company laboratories while they took seminar courses at the plant.

Perhaps the most valuable harvest from the reports of these widely varying programs is the clear evidence of a belief that all of the year-long planning and work will have been well repaid if it has succeeded in stimulating even a few young people to aim for top-level science curricula and careers. However, the records show that a gratifyingly large percentage of these promising pre-scientists will show intensified interest in their science and math courses during this school year. Many of them will turn up as science or math majors in college and, eventually, as creative contributing scientists.

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Questions

ASTRONOMY—What element is being used in a new method for determining distances to the stars? p. 307.

ENGINEERING—Where in New Zealand is the installation for converting steam to electric power located? p. 309.

GENERAL SCIENCE—Who are the persons most susceptible to hypnosis? p. 311.

Photographs: Cover, Grumman Aircraft Engineering Corp.; p. 307, Westinghouse Research Laboratories; p. 309, Minneapolis-Honeywell Regulator Company; p. 314, Fremont Davis; p. 320, Bokelite Co.

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Books of the Week

For the editorial information of our readers, books received for review since last week's issue are listed. For convenient purchase of any U. S. book in print, send a remittance to cover retail price (postage will be paid) to Book Department, Science Service, 1719 N Street, N.W., Washington 6, D. C. Request free publications direct from publisher, not from Science Service.

THE ADVENTURE OF LIGHT—Frank Jupo—*Prentice-Hall*, 60 p., illus. by author, \$2.95. A word-and-picture story of man's inventions of sources of light.

THE ARCHAEOLOGY OF COASTAL NORTH CAROLINA—William G. Haag—*La. State Univ. Press*, 136 p., illus. paper, \$3. Reporting remains of prehistoric occupation in the Cape Hatteras area.

THE AUDUBON BOOK OF TRUE NATURE STORIES—John K. Terres, Ed.—*Crowell*, 294 p., illus. by Walter W. Ferguson, \$5. Collection of animal stories which originally appeared in Audubon Magazine.

AUTOMATIC MEASUREMENTS OF QUALITY IN PROCESS PLANTS—Society of Instrument Technology, foreword by Sir Harold Hartley—*Academic*, 320 p., illus., \$9.50. Proceedings of 1957 Conference.

THE BASIC AND CLINICAL RESEARCH OF THE NEW ANTIBIOTIC, KANAMYCIN—Maxwell Finland, Ed.—*N.Y. Acad. of Sciences, Annals Vol. 76, Art. 2*, 391 p., illus., paper, \$5

BIBLIOGRAPHY ON SOUTHWESTERN ASIA: V— Henry Field—*Univ. of Miami Press*, 275 p., paper, \$6. Titles of books and articles in the fields of anthropogeography and natural history listed alphabetically by author.

BIG MOLECULES—Sir Harry Melville—*Macmillan*, 180 p., illus., \$3.95. On the principles and practical uses of the chemistry of high polymers.

CAN INFLATION BE CONTROLLED?—Harold G. Moulton—*Anderson-Kramer*, 302 p., \$4.95. Re-appraisal of the forces responsible for changes in the general level of commodity prices, and their probable trend.

CHEMICAL ENGINEERING AROUND THE WORLD

—Edgar L. Piret, Ed.—*Am. Institute of Chemical Engineers*, 507 p., illus., \$5. Surveys the field of chemical engineering outside the United States.

CURRENT CONCEPTS OF POSITIVE MENTAL HEALTH—Marie Jahoda, staff review by Jack R. Ewalt—*Basic Bks. for Joint Commission on Mental Illness and Health*, 136 p., \$2.75. Evaluation of the theoretical, experimental, and empirical evidence of the basis of mental health.

THE DOCTOR BUSINESS—Richard Carter—*Doubleday*, 283 p., \$4. On the cost and supply of medical care and the role of organized medicine.

ECONOMICS OF MENTAL ILLNESS—Rashi Fein, staff review by Jack R. Ewalt—*Basic Bks. for Joint Commission on Mental Illness and Health*, 164 p., \$3. The annual direct and indirect costs of mental illness are estimated to be upwards of \$2.4 billion.

ELEMENTS OF ENGINEERING STATICS—H. Deresiewicz—*Columbia Univ. Press*, 124 p., \$3.50. A basic one-semester course for engineering students.

EPOXY RESINS—Irving Skeist and George R. Somerville—*Reinhold*, 293 p., illus., \$5.50. Explains both the "how" and "why" of epoxy resins.

ESSENTIAL FATTY ACIDS—H. M. Sinclair, Ed.—*Academic*, 268 p., illus., \$9.50. Proceedings of the Fourth International Conference on Biochemical Problems of Lipids, Oxford 1957.

THE FAMILY HANDBOOK OF HOME NURSING AND MEDICAL CARE—I. J. Rossman and Doris R. Schwartz—*Random House*, 403 p., illus., \$4.95. A reference book on what to do after the doctor has gone.

FIELD TRIP GUIDEBOOK, ST. LOUIS MEETING, 1958—Thomas R. Beveridge and John C. Frye, Co-chairmen—*Geological Soc. of Am.*, 46 p., illus. paper, \$1.

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Our Armed Forces—Margaret O. Hyde—*Whitney House*, 106 p., illus., \$3.50.

GEORGE WASHINGTON CARVER—Henry Thomas—*Putnam*, 126 p., illus. by Andre Le Blanc, \$2. Biography for young people.

GUIDED MISSILES: Operations, Design and Theory—Dept. of the Air Force, foreword by Lt. Gen. Charles T. Myers—*McGraw*, 575 p., illus., \$8. Basic knowledge on aerodynamics, propulsion, instrumentation and guidance systems.

HAMMOND'S PICTORIAL LIBRARY OF PETS PLANTS AND ANIMALS—E.L. Jordan—*Hammond*, 256 p., 362 paintings, \$7.50. A guide to America's cultivated plants and domestic animals.

HAND IN HAND: Fifty Years of Industry-Aided Selective Cooperative Education, 1908-1958—The Hand in Hand Book Committee, Alfred L. Dowden, Chairman, prefaces by Vannevar Bush and Karl Taylor Compton—*Gordon & Co.*, 368 p., illus., \$10. Traces the development of industry-college cooperative engineering education.

INTRODUCTION TO METEOROLOGY—Sverre Pettersen—*McGraw*, 2nd ed., 327 p., illus., \$6.75. Revised textbook.

LISTENING POINT—Sigurd F. Olson—*Knopf*, 243 p., illus. by Francis Lee Jaques, \$4.50. A naturalist's observations in the Quetico-Superior country of the Canadian Shield.

LOOK FOR A BIRD'S NEST—Robert Scharff—*Putnam*, 96 p., illus. by Valerie Swenson, \$2.75. Teaches how to identify nests and tells how they are built.

LOW TEMPERATURE PHYSICS & CHEMISTRY—Joseph R. Dillinger, Ed.—*Univ. of Wis. Press*, 676 p., illus., \$6. Proceedings of the Fifth International Conference on Low Temperature Physics and Chemistry.

MAN THE MAKER: A History of Technology and Engineering—R. J. Forbes—*Abelard-Schuman*, 355 p., illus., \$5. Review of accomplishments in the field of discovery, invention, and engineering from prehistoric times to the present day.

MARINE ECOLOGY—Hilary B. Moore—*Wiley*, 493 p., illus., \$9.50. Review of ecology in relation to other sciences, with 28 p. of source material.

MASTER BRIDGE BUILDERS: The Story of the Roeblings—Kathryn E. Harrod—*Messner*, 192 p., illus., \$2.95. Biography of the father-son team that built Brooklyn Bridge.

MESSAGES, MEN AND MILES: Electronic Communications—How They Work—Robert Wells

(Continued on p. 318)

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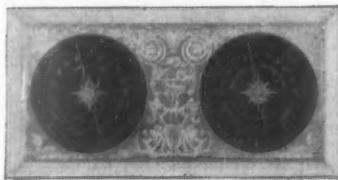
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Books of the Week

(Continued from p. 316)

—Prentice-Hall, 120 p., illus. by Frank Nicholas, \$2.95. Written by an engineer for young people.

MINERALOGY AND GEOLOGY OF RADIOACTIVE RAW MATERIALS—E. Wm. Heinrich—McGraw, 654 p., illus., \$14.50. Description of radioactive minerals and their sources, 57 p. of bibliography.

MINERALS YEARBOOK 1956, Vol. III: Area Reports—Bureau of Mines staff—Govt. Printing Office, 1292 p., \$4.25. Record of performance of the mineral industry by States.

MOMENTS OF DISCOVERY, Vol. I: The Origins of Science; Vol. II: The Development of Modern Science—George Schwartz and Philip W. Bishop, Eds., foreword by Linus Pauling—Basic Bks., 1002 p., illus., boxed set, \$15. Anthology of writings by outstanding scientists.

NUCLEAR ROCKET PROPULSION—R. W. Bushard and R. D. Delauer—McGraw, 370 p., illus., \$10. Fundamental information of value to the research and development engineer.

PARTICLE: A Quarterly by and for Science Students, Vol. I, No. 1—Dunbar Aitken and Lloyd Prentice, Eds.—Dunbar Aitken, 16 p., illus., paper, 30¢, \$1.20 annually. A forum for articles by high school and college science students.

PARKING—Geoffrey Baker and Bruno Funaro—Reinhold, 202 p., illus., \$9.50. Handbook for architects, engineers and town planners.

POISONS: Properties, Chemical Identification, Symptoms and Emergency Treatment—Vincent J. Brookes and Morris B. Jacobs—Van Nostrand, 2nd ed., 272 p., illus., \$6.50. For quick reference.

PREHISTORIC MAN IN EUROPE—Frank C. Hibben—Univ. of Okla. Press, 317 p., illus., \$4.95. Based on the notes of the late Vladimir Fewkes.

ROCKETS, MISSILES AND SATELLITES—Clayton Knight—Grosset, 61 p., illus., \$1.95. For young readers.

SATELLITE OF THE SUN: The Science of the Earth and Its Surroundings—Athelstan Spilhaus, introd. by Allen Tate—Viking, 119 p., photographs, \$3.50. An essay on geophysics for the non-scientific reader.

SMITHSONIAN INSTITUTION ANNUAL REPORT 1957—Leonard Carmichael, Secretary—Govt. Printing Office, 499 p., illus., \$4.50. Reports on cosmic rays, meteors, radio astronomy, pollen and spores, bamboo, red tide and stone age skull surgery.

Science News Letter, November 15, 1958

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• **STACKING PADS** of white felt are used to separate fine household dishware and prevent chipping, scratching and rattling. The pads are in three sizes (4½, 5½, and 7½ inches in diameter) for saucers, salad plates and dinner plates.

Science News Letter, November 15, 1958

• **CLASSROOM TV RECEIVER** can be used in either closed-circuit systems or for viewing over-the-air broadcasts from educational and commercial stations. When used in closed-circuit systems, the screen has a 500-line picture for detailed reproduction of microscope slides and such. A simple switch changes the set to commercial broadcast reception.

Science News Letter, November 15, 1958

• **MASSAGE CHAIR** for executives has a built-in rotary motor which imparts a cycloid or "Swedish" massage type of motion to the occupant. Molded foam cushions in the back, arms and seat transmit the action of the motor. Under the seat is a hidden five-speed control.

Science News Letter, November 15, 1958

• **FROZEN FOOD KNIFE HANDLE** has a recess in the top and a curve on the



underside for a firm grip. The plastic offset handle, shown in the photograph, makes it possible to cut frozen packages without having to rock the knife. Ordinary cleaning agents will not affect the plastic.

Science News Letter, November 15, 1958

• **TUFTED AIR MATTRESS** for camping is inflated to a height of five inches. Inflated, it is 25 by 72 inches and weighs 52 ounces. The sides have tubes of I-beam construction and the middle portion is

tufted. The material is a two-ply clothlike plastic.

Science News Letter, November 15, 1958

• **ULTRACENTRIFUGE AUXILIARY EQUIPMENT** consists of a radiation shield and heating element mounted in the rotor chamber; heat-reflecting baffles; a power supply, and a rotor temperature indicating and control unit. This equipment allows the ultracentrifuge to operate between 120 degrees Centigrade and 0 degrees Centigrade.

Science News Letter, November 15, 1958

• **SAFETY LIGHT** has no filaments and is practically glare-free. It will burn day and night for a full year for less than a penny. The "bulb" is an electroluminescent cell, which consists of a phosphor coating on a glass panel that is treated to conduct electricity. The lamp has a rated life of 10,000 hours and runs on 1/200 of a watt.

Science News Letter, November 15, 1958

• **WORK TABLE** has a hard maple top, formed steel pedestal legs and a reinforced shelf for storage or foot rest. The top is 1½ inches thick, 30 inches wide and 60 inches long. The shelf is 20 by 51 inches.

Science News Letter, November 15, 1958



Nature Ramblings



By BENITA TALL

► SOMETIMES when you are walking through a clearing in a woodland or through a meadow, you may come across a strange marking on the grass: a fairy ring.

A perfectly round ring of dry yellow grass encloses an area of bright green, lush-looking grass. The ring may even be bare of any vegetation at all.

Folk tales have an explanation for the ring. It is a kind of fairy "brand." Wherever fairies dance no grass can ever grow, but the grass inside the ring of dancing fairies grows better and greener because of the fairies' nearness.

This is one explanation, certainly. There is another, however, and the key to this explanation is toadstools.

The toadstools that are seen are actually only the fruiting bodies, parts of the plant formed for the production and liberation of spores, the toadstool's "seeds." The rest of the plant, what would correspond to its

Fairy Ring



stem, leaves and roots in other plants, is below ground. Threadlike hyphae make up this vegetative part of the toadstool. When there are many hyphae in a mass, they are called a mycelium.

For many species of toadstools, these mycelia are perennial, remaining in the soil and producing "fruit" year after year. The mycelium expands radially. As it grows, it obtains food through the action of enzymes on organic material in the soil. Ammonium

salts formed by this action of the mycelium stimulate the growth of grass and other plants. This is the reason for there being an area of especially healthy looking plants.

Eventually, however, the mycelium fills the spaces between soil particles, water cannot be absorbed and there is a drought above ground. And a bare ring surrounds the fertile area.

Fairy dance or fungus growth: these are two theories for the fairy ring. Make your own choice.

Many persons make a common-sense distinction between toadstools and mushrooms and call all poisonous growths toadstools and all edible ones mushrooms. Plant experts agree, however, that this is not a very scientific way to name plants. One suggested way to solve the toadstool-mushroom controversy is to keep the name mushroom for the genus *Psalliota* which provides our cultivated mushrooms. All others, poisonous and edible, would be toadstools.

Science News Letter, November 15, 1958

